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Obituary

Remembering Eva Neer

In that time spanned by the blink of an eye, I see Eva Neer, all 5′2″ of her, playing basketball with Ernie Peralta and his graduate students. I see her volunteering to wriggle through a small window to let fellow late night revelers into the bar after hours at a signal transduction Gordon Conference. I see her quietly, but courageously, standing up to scientific and societal bullies. Eva Neer, Harvard Professor of Biochemistry, died February 20, 2000 from breast cancer at the age of 62.

In 1939, at 1 year of age, Eva Julia Augenblick escaped the Nazi invasion of Warsaw under her mother's skirts. The only child of a lawyer father and a Rabelian scholar mother, her family spent 5 years in Brazil before emigrating to New York. Educated first at Radcliffe, she finished her degree at Barnard while her husband, Robert Neer, was beginning his studies in medicine at Columbia. Eva also studied medicine at Columbia, and carried out postgraduate work at Georgetown University Hospital and Yale University before returning to Harvard to begin her careers as mother and scientist. She brought a magic to both that made the kind of success that is most valuable, a full life that was appreciated by its owner even as it was being spun out. And in turn, she enriched all those who came close to her.

At Harvard, Eva was a postdoctoral fellow in the laboratory of Dr. Guido Guidotti. She was an excellent and independent biochemist, working to characterize adenylyl cyclase, the enzyme that generates the universal second messenger cAMP. During this time she had two boys, Richard and Bobby, often bringing them to the laboratory while she carried out experiments. She loved the tolerant atmosphere of the Guidotti lab where Guido gave her latitude to pursue her own ideas in her own time frame. In 1976 Thomas Smith, the new chair of the cardiovascular division at Brigham and Women's Hospital, had the good sense to hire her as a basic scientist. She remained in the department until her death, and was highly valued as an investigator and mentor.

It was my good fortune to collaborate with Eva Neer. In 1986 my laboratory moved into the space across the hall from hers in the new Thorn building at Brigham and Women's Hospital. At first we did not know each other and may have been a little distrustful. Eva was a biochemist—a field that to me was suspiciously close to cooking. As an electrophysiologist, I was as far removed from biochemistry as one could get. We were both interested in the heart; Eva in the role of GTP binding proteins (G proteins) and I in ion channels. We did not know it at first, but the powerful patch-clamp method of Neher and Sakmann was about to allow us to change the dogma in signal transduction. Work in 1985 by the laboratories of Hille, Szabo, and Kurachi showed that the ion channel responsible for vagal-mediated slowing of heart rate was regulated by G proteins. With my student, Diomedes Logothetis, and colleague, Yoshi Kurachi, we decided to settle what we thought was the simple question of which G protein α subunit activated the channel. Fortunately for us, the person across the hall cooked up G proteins for a living.

The most precious possession of a biochemist is purified protein, and like gold in the bank, they spend it cautiously. Luckily (and wisely), Eva was hesitant to give us her most purified Gα subunit. Instead, she gave us a crude mixture that contained both G protein Gα and G$\beta\gamma$ subunits. When applied to the intracellular surface of a patch-clamped heart cell, it activated the channels like rocket fuel. Now, with Eva's full attention, we worked together and quickly came to understand it was the G$\beta\gamma$ subunit that was the active component. We published this fact in *Nature* in 1987, and were quite happy and proud of ourselves, thinking of all the experiments we could do next.

But scientists are conservative, not unlike priests in the fifteenth century, and these findings were heretical. We further aggravated our critics by taking a bit of impish delight in the process, and angering a pair of prominent and aggressive scientists. Their laboratories reported in over a score of papers that it was the Gα subunit alone (at subpicomolar concentrations) that activated the channel. In meeting after meeting, they insisted that our work was wrong. We suffered under the Gα inquisitors and about this time Eva put up a poster of Joan of Arc in her office. One could spend a lot of time describing these scientific battles, and how we felt, but a quick summary is to imagine us crouching behind Joan of Arc's shield before fire-breathing dragons. But we kept working, and other laboratories eventually entered the field. By 1994, it was finally accepted that G$\beta\gamma$, not Gα,

Eva Neer

activates the channel. Now it is clear that Gβγ activates as many effectors as Gα. During those difficult years, I had the immeasurable gift of collaborating with a person who was honest, true, and courageous.

Eva continued to pursue the structure and function of Gβγ for the rest of her career. After the crystal structure of the complex was revealed independently by the Sprang and Sigler laboratories, she characterized the sites of interaction of the protein with Gα and phospholipase Cβ, and, in collaboration with Temple Smith, provided insights about the structures of proteins like Gβγ. She also continued her work on G proteins in cardiac cells by identifying Gα genes, producing transgenic mice with modified G protein function, and posing interesting questions about the mechanisms of heart failure. Ulrike Mende, Thomas Michel, and Christine Seidman of Brigham and Women's Hospital were active collaborators at the time of her death.

Many have benefited from Eva Neer's good, brave heart and deep down sense of decency. Eva's students and postdoctoral fellows left her laboratory with a sense for scientific honesty (and also the rather unique skill of being able to sing "Happy Birthday" in Polish). She was a tutor for undergraduate biochemistry students at Harvard College and a master of the Cannon Society at Harvard Medical School. With wisdom and understanding she took on the task of surveying the career paths of women faculty at Harvard Medical School, fighting hard to make it a more fair environment. Eva was recognized nationally for her scientific contributions: she was elected to the National Academy of Sciences and was awarded the basic science award of the American Heart Association. Not everyone's lives are as fulfilled as that of Eva Neer's; she had a career of significance and accomplishment, a life-long joyous marriage, and two wonderful and successful children. And few take on the future with as much spirit and determination.

Most of Eva's friends did not know that she had breast cancer for the last 11 years, and some were puzzled and hurt when she suddenly left without saying a word of farewell. I think I understand why she left us quietly and without fanfare. In his novel about war, James Jones described the division between the wounded who have dropped out of the battle and those as yet untouched. None of us wants to be put into that group across that thin red line, and that is why Eva did not talk about her illness. She enjoyed her life as she lived it and wanted others to see her as the full participant she was. Inescapably, all of us will cross the line that separates us from our colleagues. We should learn to be kind to each other in the meanwhile.

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